BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Engineering (optional unit) Pearson BTEC International Level 3 Diploma in Mechanical Engineering (optional unit) Pearson BTEC International Level 3 Diploma in Manufacturing Engineering (optional unit) Pearson BTEC International Level 3 Extended Diploma in Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Aeronautical Engineering (Optional unit)
Unit number and title	**Unit 28: Dynamic Mechanical Principles in Practice**
Learning aim(s)	**A:** Explore the dynamic characteristics of linear and rotational motion that are applied in mechanical systems
Assignment title	1 Linear and rotational motion in mechanical systems
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You have successfully completed part of an apprenticeship with a company that designs and supplies complex mechanical products for a wide range of industries. Your latest placement in the company is with the Design Department. The Department is responsible for designing bespoke solutions for customers as well as standard components and systems. Many of the designs incorporate moving parts. You will be working with a Senior Design Engineer who has identified some knowledge and skills that you need to develop before you can understand customer requirements and apply them to designs.
Task 1	You have been asked to investigate the linear and rotational motion of objects and how they can be applied in simple and complex mechanical systems. **To do this:** You will carry out a series of practical activities safely, in

	accordance with relevant risk assessments, for given linear dynamic systems, given rotational dynamic systems and complex dynamic systems involving both linear and rotational motion. You need to produce a report that includes detail of the investigations carried out, including comparisons between measured values and those predicted by theory. You need to use the available apparatus to carry out practical investigations and record the results systematically for: The linear dynamic system: a) The relationship between mass and acceleration for a uniform force b) The relationship between force and acceleration for a fixed mass c) Acceleration due to gravity of a freely falling body d) Conservation of momentum e) Friction between surfaces f) Friction on an inclined plane The rotational dynamic system g) The effect of the following variables on circular motion: • mass of object • radius of circle • speed of object h) Rotational kinetic energy in the system You should then: Outline the relevant theory for each of the investigations and compare your measured results with those predicted by theory. Note: You may find it preferable to carry out the practical investigation and theoretical analysis of one topic before progressing to the next. You also need to: Calculate the minimum height of release of a roller coaster carriage to complete a loop of given diameter. [Your tutor will give you the mass of the carriage and the diameter of the loop]. You should state any assumptions that you have made.
Checklist of evidence required	A portfolio of results, including tables, and graphs gathered by experimentation when investigating linear and angular motion and by theoretical calculation, supported by images, observation records and mathematical modelling. Annotated calculations to solve the roller coaster problem.
Criteria covered by this task:	

Unit/Criteria reference	To achieve the criteria you must show that you are able to:
28/A.D1	Evaluate a simple linear and a simple rotational mechanical system, comparing the results from safely and accurately conducted experiments and calculations, while using the principles to model accurately a complex system in which both linear and rotational motion are present.
28/A.M1	Conduct experiments accurately to determine the dynamic effects associated with the acceleration of a simple linear and a simple rotational system.
28/A.M2	Prepare, using experimental results and calculations, accurate models for the simple linear and simple rotational mechanical systems, comparing the two models.
28/A.P1	Conduct experiments safely to determine the motions and energy transfers taking place in a uniformly accelerated simple linear and a simple rotational system.
28/A.P2	Prepare, using experimental results and calculations, models for the simple linear and simple rotational mechanical systems.

Sources of information to support you with this Assignment	Books BTEC Level 3 National Engineering Student Book (Level 3 BTEC National Engineering); Buckenham et al; Pearson Education (2016); ISBN-13: 978-1292141008[new edition due] Mechanical Engineering; Darbyshire A; Routledge (2010); ISBN-13: 978-0080965772 Mechanical Engineering Principles; Bird, Ross; Routledge (2014); ISBN-13: 978-1138781573 Websites miniphysics.com/a-level-physics-revision-notes-junior-college-physicsh1-h2.html Above are some examples of websites. Further useful resources may be found at qualifications.pearson.com/en/support/published-resources.html#step1
Other assessment materials attached to this Assignment Brief	Practical instructions for the apparatus used to carry out each of the required practical investigations.